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ABSTRACT

This series of leaflets provides information about nature education in outdoor settings. Each issue begins with an account of a personal experience with children in nature. Following the personal narrative is a section titled, "A Nature Primer," which provides scientific information about a topic in nature. The next section, "Ready, Set, Go" presents nature activities for children related to the topic. The final section, "Naturally Good Reading," suggests books and other resources for nature studies with children. The four issues in this series cover the following topics: (1) noticing and understanding changes in nature during spring; (2) finding bird nests; (3) understanding decomposers in the ecosystem; and (4) watching bugs in the winter. The leaflets contain illustrations on every page. (KS)

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BIRDS BATS & BUTTERFLIES

A leaflet for adults who want to share nature with children

1992

No. 1, 2, 3, & 4

Roger Tory Peterson Institute

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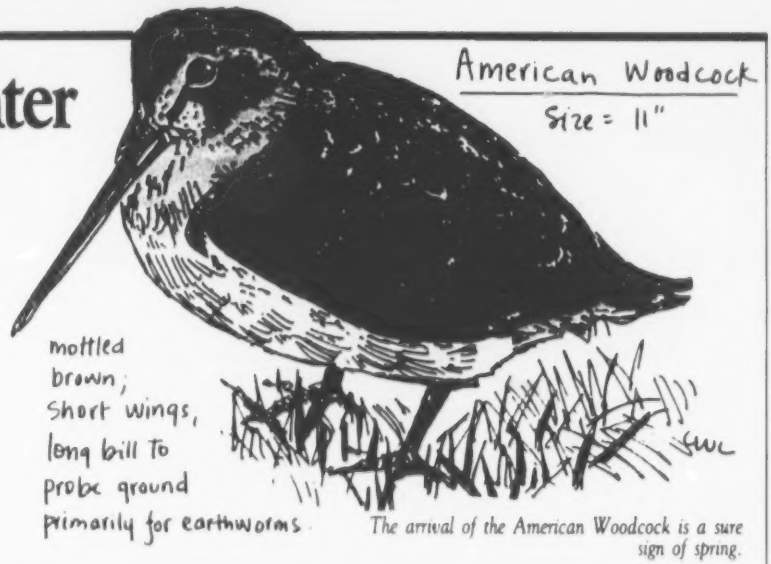
Birds Bats & Butterflies

Number 1

A leaflet for adults who want to share nature with children

1992

"For Lo, the Winter Is Past!"



The arrival of the American Woodcock is a sure sign of spring.

It was a cool April morning. Zipping up my jacket, I led twenty exuberant second graders onto the nature trail near our school. The woods were filled with sunshine and the energetic voices of eight-year-olds. We approached a gurgling brook and paused to sniff a fragrant spicebush covered with honey-colored blossoms. Then I pointed out the small fuzzy nubs of ferns breaking through damp ground. This started all the children on a search for Fuzzy Wuzzy Fiddleheads. Eric wrote in his journal, "Fuzzy Wuzzy Fiddleheads are at my sneakers." The rapidly growing interrupted ferns fascinated him. He wrote successively after weekly walks, "Ferns at my knees. . . They're up to my belt. . . They have spores now, and they are in the middle, and that's why they're called interrrupted ferns."

Upon returning to the classroom after each walk, the children took turns telling each other about what they saw. They also sketched and wrote to become better observers and to make their woodland discoveries more memorable.

I, too, made a lot of woodland discoveries as a child, exploring the oak woods behind my house with my friend Cynthia. We would often meet at the old cart path, then climb down the cliffs to the swamps and meadows in search of salamanders and new flowers to identify using a pocket guide my mom had given me on my eighth birthday. Eleven-year-old Cynthia had an artist's eye. She often noticed distinguishing details that I overlooked at first. She also gave me courage to explore the woods. As a teacher, I have tried in a similar way to encourage my students to explore nature.

Beneath a hemlock tree on a damp May morning, curious children bent over a Jack-in-the-pulpit and called out, "Chocolate or vanilla?" The green spathe, or pulpit, hid Jack, the preacher. Would he be light green, or a dark chocolate? Maybe different soil conditions determine Jack's color, but to the young naturalists, it was all part of the fun.

In May, the Canada Mayflowers' leaves poked through fallen White Pine needles. Each week we saw new leaves, then flower buds and finally foamy blossoms. Overhead, the gold-green leaves of oak, birch, beech and ash turned quickly to dark green. By the end of May the pageant of spring had reached a climax, soon to give way to summer.

It is June and the last nature walk of the school year. Approaching the dry brook, I clip a few tender branch tips from a Black Birch for the children to chew on. Sitting under a shady canopy of oak and ash, children share their poems with each other, recalling what was important to them. Nine-year-old Lara reads,

Nodding trillium
We went on a nature walk
Interrupted ferns

Skunk cabbage still stinks
Spores of interrupted ferns
bud of a nut tree

Jack-in-the-pulpit
Poison ivy has red leaves
Sprouting fiddleheads

Diane Temple is a second grade classroom teacher at The Harvard Elementary School in Harvard, Massachusetts. The poem was written by Lara Niell, a former student.

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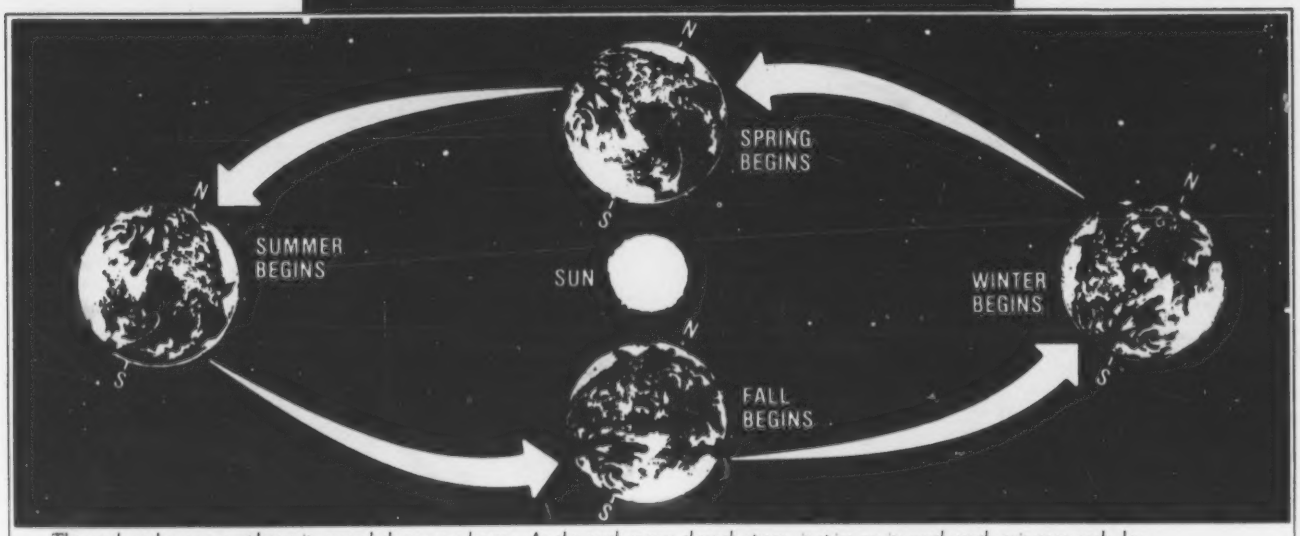


The earth makes one complete trip around the sun each year. As the earth moves through space, it spins on its north-south axis once each day. This axis is not completely vertical; it tilts by 23½ degrees. During spring and summer, the northern half of the earth leans toward the sun. During fall and winter, the northern half leans away from the sun. It is the tilt of the earth, not actual distance from the sun, that causes the seasons. This diagram is not to scale.

New sensations are more wondrous than walking outdoors on the first warm morning in spring. The air is moist and rich with new smells; a soft breeze blows over swelling buds. Your skin tingles. The sap rises in the trees and a few migrating birds return, and you can feel your senses reawakening. Deep inside, you know that it is important to celebrate life's return, both outdoors and in ourselves. If your own senses seem more acute when spring returns, let that be a sign that you are as much a part of nature as the trees with their new leaves. Children, too, react to spring's changes with much excitement, and many questions. Let's answer some of them:

Why do the days get longer in spring?

As the Earth revolves around the sun, it tilts on its axis—the line connecting the north and south poles. When the northern half of the Earth is tilted away from the sun, it's winter there. In the spring, the northern hemisphere slowly tilts toward the sun. Every day, the sun travels a little higher in the sky, and we get a few more minutes of sunlight. Around March 21, the spring equinox, days and nights are about the same length.

Why does it get warmer in spring?

The increasing amount of sunlight raises the temperature. A few extra minutes of sunlight a day may not seem like much, but even in that short time the sun delivers an enormous amount of energy to the Earth.

Why do tree leaves appear in spring?

Most plants are dormant in winter because they rely on water to carry out essential functions, such as the transportation of food. Deciduous trees, which drop their leaves in autumn, "wake up" when the soil warms enough to hold water as a liquid rather than as ice. As the weather warms, sap rises in the trunks of trees, carrying nutrients from the soil up into the branches. The infusion of water and minerals causes the buds at the ends of the twigs to open, forming flowers and the new leaves that will work to turn sunlight into food.

How about smaller plants, like garden flowers?

Perennial plants—tulips and daffodils, for example—store food in their bulbs all winter. That stored energy enables them to send up new shoots once liquid water is available to them again.

Annual plants, such as some wildflowers and many domesticated vegetables, sprout from seeds. The seeds are sensitive to temperature, and begin growing once the soil gets warm enough.

Why do insects and other animals come back in spring?

The food produced by leaves is not used only by the plants. The fresh green leaves of spring feed many animals, including insects, most of which overwinter as eggs or larvae. Now, with warmer temperatures and a reliable food source, they can complete their growth to adulthood. Deer, rabbits and other mammals also relish fresh sprouts.

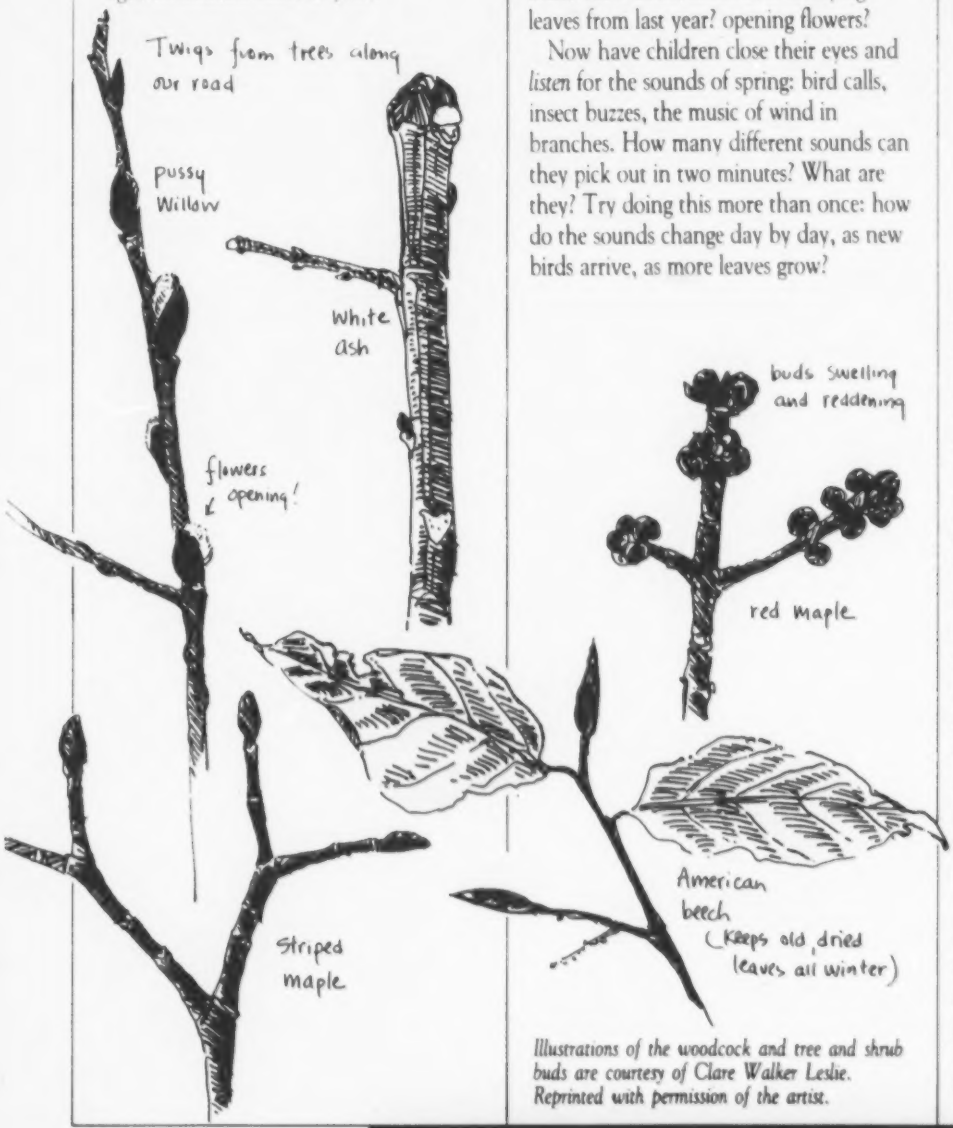
The sudden profusion of insects is itself a rich new food source for predators, such as carnivorous insects and birds. The migration of many bird species is timed to coincide with the emergence of new plant growth—so when warblers or thrushes land in your garden, you can be assured that there is already an ample supply of insects for them to eat.

Peter Friederici is a free-lance writer with a special interest in natural history subjects.

READY

by Peter Friederici

You can help children understand why spring comes by doing a simple astronomy demonstration. Take an orange, or a tennis ball, and draw on it the equator and the north and south poles. This is the Earth. Sit in a darkened room, and use a candle or flashlight as the Sun. By tilting the Earth on its axis, you can demonstrate how the northern and southern halves of the planet receive different amounts of light at different times of year.



Illustrations of the woodcock and tree and shrub buds are courtesy of Clare Walker Leslie. Reprinted with permission of the artist.

SET

Children love exploring the outdoors and using all their senses. By joining in their joy and curiosity at new discoveries, you can uncover some of your own sense of wonder. But you can also suggest some methods of exploration that children will enjoy. Go outdoors and try *feeling* different objects: buds, bark, new leaves. How do the leaves feel on your fingers? your palm? your cheek? How do the leaves *smell*? How about moist soil? decaying leaves from last year? opening flowers?

Now have children close their eyes and *listen* for the sounds of spring: bird calls, insect buzzes, the music of wind in branches. How many different sounds can they pick out in two minutes? What are they? Try doing this more than once: how do the sounds change day by day, as new birds arrive, as more leaves grow?

GO

One of the most effective ways to enhance observational skills is to keep a nature journal. Even young children can record some of their observations and feelings about nature in a journal. Just get a notebook (unlined paper is best) for each child, along with an assortment of pencils, pens and crayons, and head outside.

Have the children look closely at a tree's swelling buds, new leaves, or flowers. Depending on age, children might:

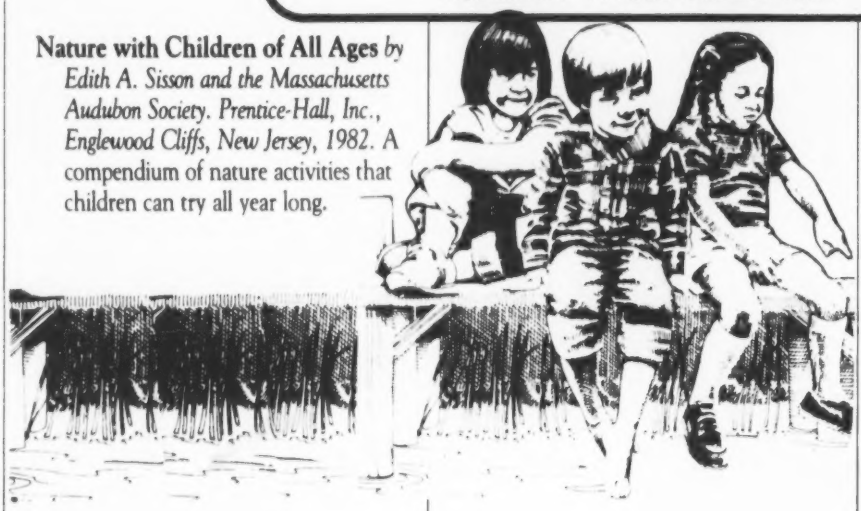
- draw the buds or flowers
- write down their feelings about what they see
- do a finger painting of the tree
- collect leaves (in as many different shades of green or shapes as possible, for example) and paste them in a journal
- record what the weather is like.

Nature journaling is ideal for kids because they are not intimidated by drawing, painting or scribbling. The exuberant creativity of children can be a great inspiration to adults. Once the children are happily at work, try it yourself. Don't worry about creating an "expert" drawing; just observe a bud or leaf closely enough that you can put something about it down on paper. Try returning to the same place for several days and recording how the bud or leaf changes. Does it get bigger? change shape? color? Ask the children the same questions. By recording changes in a journal you train yourself to become more perceptive. Make journaling part of your life: you will soon be detecting patterns in plant growth, weather, bird migration and many other seasonal rhythms.

Share whatever you observe or draw with the children, and encourage them to do the same. Observing nature closely is a nonstop learning process—and it is only when we share what we have seen with others that we have really learned to see.

NATURALLY GOOD READING

Books and other resources for nature studies with children



Nature with Children of All Ages *by Edith A. Sisson and the Massachusetts Audubon Society. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1982.* A compendium of nature activities that children can try all year long.

Nature All Year Long *by Clare Walker Leslie. Greenwillow Books, New York, 1991.* Each month of the year is celebrated with special activities, facts and colorful drawings to inspire the young naturalist.

The Naturalist's Path: Beginning the Study of Nature *by Cathy Johnson. Walker and Company, New York, 1991.* An introduction to what to look for in your local woodlot or overgrown field, and how to get to know it.

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Birds Bats & Butterflies

Number 2

A leaflet for adults who want to share nature with children

May 1992

Be a Nest-Finder

by Allen Benton, Ph. D.

We were walking along a wooded trail, returning from an early morning bird walk. My young companion knew his birds. "That's a Hooded Warbler singing," he said.

"We ought to be able to find the nest," I said. "Hooded Warblers like dense tangles like this." I bent down to look upward into the berry bushes lining the trail. There, right before my eyes, was the warbler's nest.

"You knew where it was all the time," he said accusingly, as he looked at the nest carefully concealed beneath the leafy canopy of the bushes. And all my fervent denials could not convince him otherwise.

In fact, finding the nest resulted from a combination of knowledge, experience, and luck. I knew the preferred nesting habitat, and these bushes were the only such habitat anywhere in sight. So it was probable that the presence of a singing male nearby indicated a nest in that tangle.

Finding bird nests is an art that takes a long time to develop, but young people can do it if they have enough desire and a little guidance. First, you must learn to know bird song, since all songbirds sing on their nesting territory. Then you must study bird behavior, to learn those little quirks of behavior that reveal the presence of a nearby nest. And last, you need to learn to think like a bird: to understand how they achieve the concealment that is necessary if they are to be safe from predators; where they like to build; what materials they use for the nest; how they approach and leave it.

Birds that nest on or near the ground are likely to slip away from the nest while you are still some distance away, and then fly up noisily so that you will go to the spot they've flown from and not where the nest is. Skilled nest-finders often overcome this tendency by carrying a long slender stick, which they swish back and forth across the vegetation a few feet in front of them. As the stick brushes over the leaves above the nest, the bird may be alarmed and spring up directly from the nest, making it much easier to find.

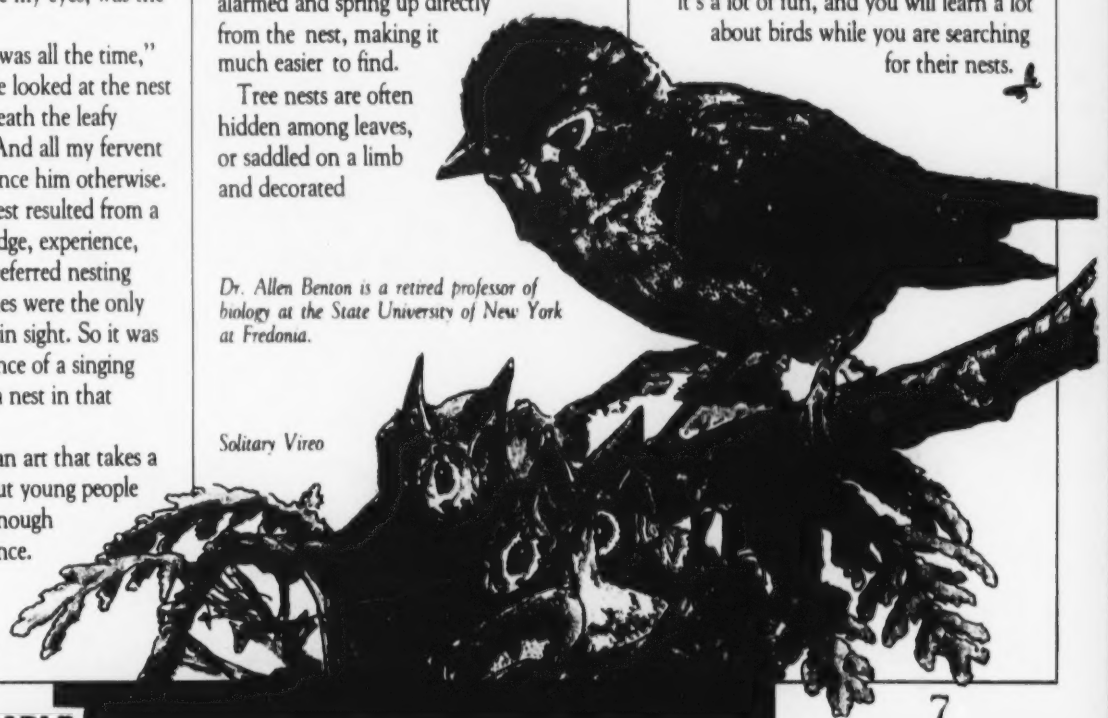
Tree nests are often hidden among leaves, or saddled on a limb and decorated to resemble the tree itself. Even a fairly large, bulky nest like that of the Wood Thrush may be hard to see among dense foliage.

Nests are easiest to find when the adults are feeding young. Once a nesting pair is located, you can sit quietly and watch as they bring food for the young. They may be suspicious and fuss at you for a while, but if you remain still they will eventually take the food to the baby birds.

If you want to become a nest-finder, remember that the safety of the nest is the most important consideration. Too many approaches to the nest, or removal of any vegetation to make the nest easier to see, may expose it to predation. Once you have located the nest, stay away and observe it from a distance.

Finding bird nests is a challenging pursuit. It's not an easy thing to learn, but it's a lot of fun, and you will learn a lot about birds while you are searching for their nests.

Dr. Allen Benton is a retired professor of biology at the State University of New York at Fredonia.



Solitary Vireo

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A NATURE PRIMER

Emily Thompson was helping her dad water the newly planted vegetables when she noticed a quick flash of black and white wings in the woods behind the backyard. "Dad!" she yelled. "Did you see that?"

Emily pointed at the place where the thing had vanished. But nothing moved. There was only a hole in a large dead branch of the old oak.

"Maybe a bird lives there," said Mr. Thompson, and before he could finish the sentence, the two saw a gray beak poking out from the hole, followed by a brilliant crimson head. "It's a Red-headed Woodpecker!" he said as the bird plunged from the hole, unfurled striking black and white wings, and flew off through the trees.

"I'll bet it'll come back soon," he said. "And if you watch real close, you might see it carrying something."

"What do you mean?" asked Emily. But her dad only smiled and suggested that she go get the binoculars from the porch.

The next time the bright white patches gleamed among the new spring leaves, Emily was ready. She focused on the bright red head as the bird perched briefly on the oak trunk. "It's got bugs in its beak!" she yelled.

Her dad smiled. "That's right," he said. "It's carrying food to the babies."

"There's babies in the tree?"

"Sure," said Mr. Thompson. "That's a woodpecker nest. I'll bet there's another woodpecker in there keeping the babies warm."

"But I thought birds built little nests in bushes and laid their eggs there."

"Many of them do," said Mr. Thompson. "But different birds have different kinds of nests. Lots of them nest in trees like these, or in birdhouses people put up for them. Some nest right on the ground. Some even nest in buildings or on porches."

"How come they have to have nests anyway?" asked Emily.

"Birds have to keep their eggs warm until they hatch. A nest is a safe place for a parent bird to sit with the eggs. And even after they've hatched, many baby birds are pretty helpless for a few weeks. They need to live where predators can't find them—and that woodpecker nest up there is pretty hard to get to."

The bright wings flashed again. "Does it just keep flying back and forth all day?" Emily asked.

"Pretty much so," said her dad. "Baby birds grow very fast, so they have to eat almost nonstop. Their parents are busy all day long finding food and feeding the young ones. That's why they nest here in the spring and summer, when there are plenty of insects around for food."

"In that case, I won't mind any more when mosquitoes bite me, if the birds will eat them!" said Emily, as her father smiled at her.

by Peter Friederici

Red-Headed Woodpecker

Here's a look at nests built by...

Common Tern

Loggerhead Shrike

Osprey

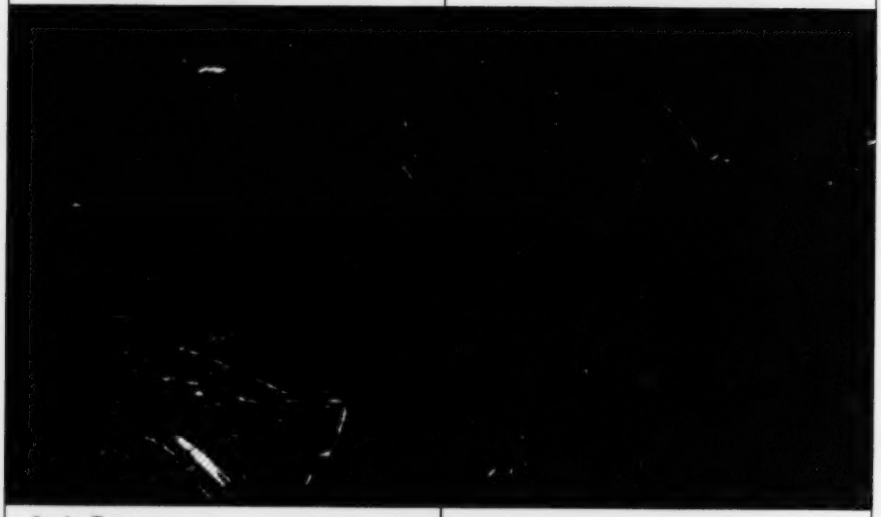
READY

You can help children gain a greater appreciation of birds' nests by having them build their own. Gather together small sticks, long pieces of grass, and bits of string. (It's best to do this outside, as it can get messy.) Ask the children what else they might include in a nest. Then encourage them to build a nest by weaving together the materials. Ask them how sturdy the nest needs to be. Where would they build their nest? How long would it need to last? How could they help make sure it isn't discovered by a predator?

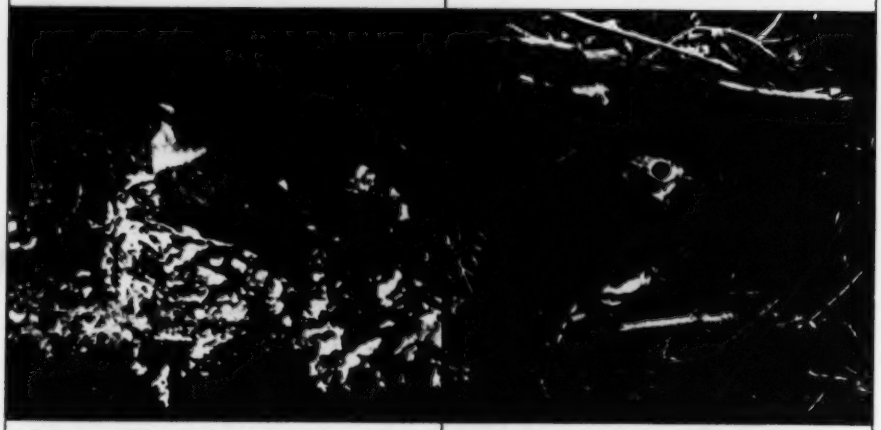
SET

Many common garden birds weave string, yarn, and other "unnatural" materials into their nests. Hang short lengths of yarn on bushes and trees in your yard, and you and your children may be rewarded with the sight of orioles or goldfinches flying off toward their nests, trailing colorful streamers from their beaks.

If you live in an area with little open water, consider creating a small mud puddle in your yard. Robins and swallows may visit to collect the mud they use in constructing their nests.



Scarlet Tanager



Ruby-throated Hummingbird

Ovenbird

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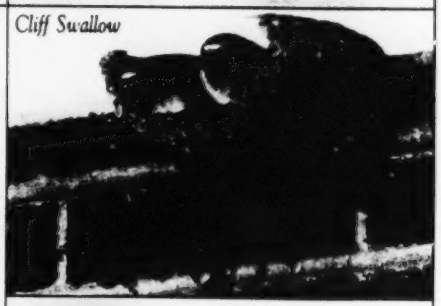
Cliff Swallow



Watching a bird nest provides unending enjoyment and learning for children and adults alike. You may be able to find a nest by watching a bird carry nesting materials you've put out—and if you do, and observe carefully, you will have an unparalleled look at the home life of birds. You'll be able to see young birds grow up. Note: Young birds are often found on lawns or in gardens when they're just old enough to try to leave the nest. They may look abandoned, but it's best to leave them alone. Chances are the parents are around and will help their young once the coast is clear.

But you probably also see birds whose nests aren't so easy to find. You can still use any sighting to teach your children (and yourself) about birds. If a child spots a gull, or a crow, or a cardinal, ask him or her questions like these: Where do you most often see this bird? Where does it go to find food? Where does it go to find shelter? Where do you think it builds its nest? What does this bird need in order to survive? Explain that different birds thrive in very different environments—but they all need safe places to rear their young.

Nests can be found in the most diverse places, and their appearance is varied, too. Some nests are no more than a bare spot on the ground; some are complex architectural wonders.

Peter Friederici is a Chicago-based free-lance writer with a special interest in natural history.

The photographs in this issue were taken by Dr. Olin Sewall Pettingill, Jr.

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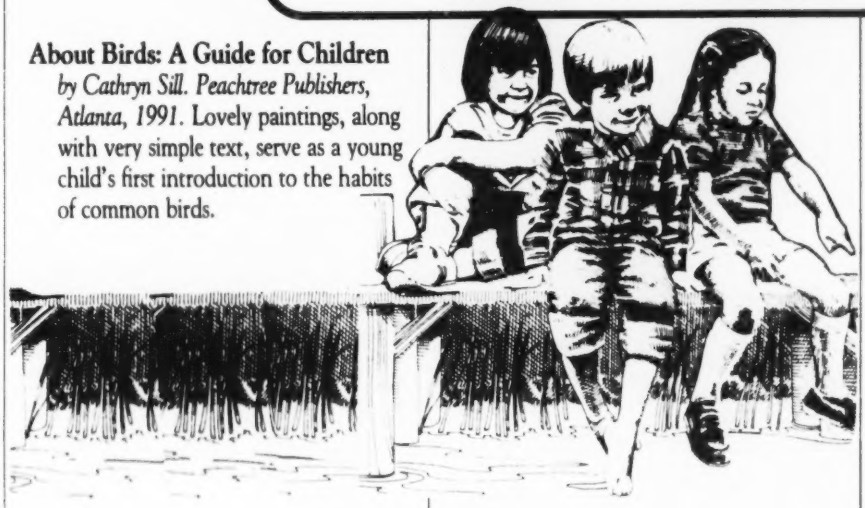
NATURALLY GOOD READING

Books and other resources for nature studies with children

Hosting the Birds: How to Attract Birds to Nest in Your Yard *by Jan Mahnken. Storey Communications, Pownal, Vermont, 1989.* An overview of what common garden birds look for in a home.



About Birds: A Guide for Children *by Cathryn Sill. Peachtree Publishers, Atlanta, 1991.* Lovely paintings, along with very simple text, serve as a young child's first introduction to the habits of common birds.

The **Peterson Field Guide Series** *edited by Roger Tory Peterson. Houghton Mifflin Company, Boston.* Color photos illustrate these two identification guides:

Birds' Nests (Eastern) *by Harrison*
Western Birds' Nests *by Harrison*

And learn to recognize bird songs by referring to the following audio cassettes, compiled with the help of the Cornell Laboratory of Ornithology:

Bird Songs *(Eastern and Central)*
Western Bird Songs
Birding by Ear
Backyard Bird Songs

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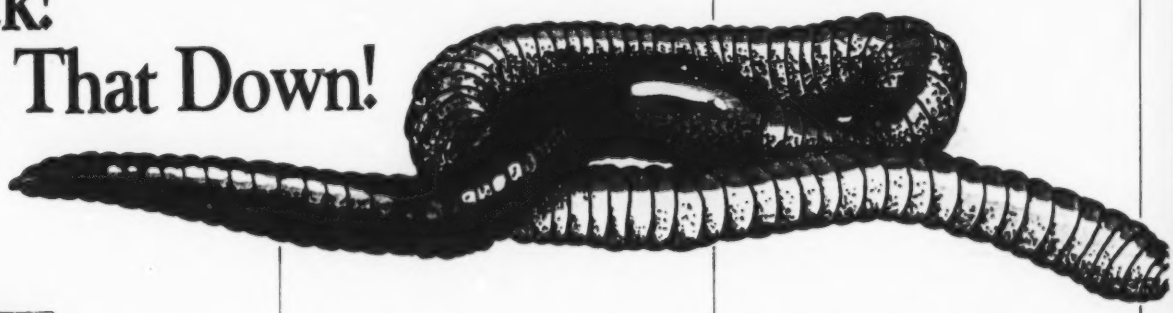
Birds Bats & Butterflies

Number 3

A leaflet for adults who want to share nature with children

1991

Yuck! Put That Down!



Another's cry of alarm rose above the friendly chatter of several neighbors down the street. "Put that down, Sarah!" The other moms saw what was the matter, and quickly joined in. The eighteen-month-old looked up and smiled at the chorus, gently handled the fat earthworm for a moment, then put it back in the grass. Eventually, the grownups calmed down, satisfied that Sarah had learned their lesson—that worms are nasty, and little girls should not go around picking them up.

Recently, while out for a morning walk, I thought about that scene as I tried hard to avoid stepping on hundreds of earthworms that had escaped to the pavement from their rain-flooded burrows during the night. I was amazed at how abundant they were. I thought that even if I am not repulsed by them, I certainly take them for granted. They are crucial to the workings of the land, as they secretly recycle the elements upon which life depends. But somehow, knowing that did not make me feel very sympathetic toward them, not even as I saw them then, out of the earth and on that alien blacktop, doomed to become flattened leather laces by afternoon. I was reminded of the "Red Hybrid" worms I had seen advertised in a seed catalog. "Can be released directly into your garden without handling," it said. Maybe it's not on purpose that we have a hands-off attitude toward animals like earthworms. Perhaps we prefer a sanitized version of nature, where no soil is eaten, no mucus secreted. Certainly, we feel closer to animals that are more like us, warm-blooded animals with fur or feathers and expressive faces. So what could have changed the feelings expressed by those parents the other day? I wondered.

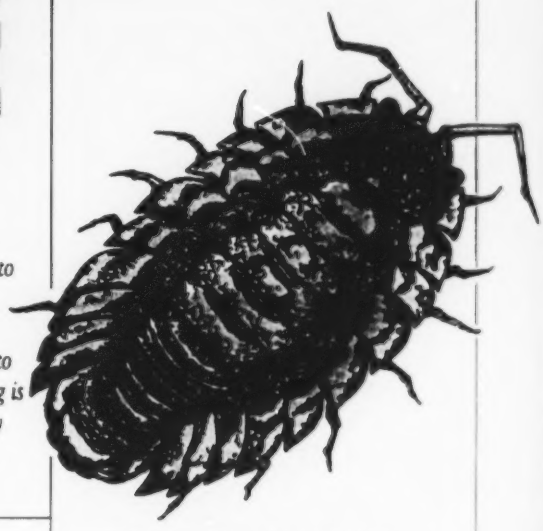
I wish we could always be in tune with that look...

Nothing, I guessed, as I rounded the corner of our street and headed home.

Nothing, except for the look on Sarah's face as she explored that worm, as she found out for herself how cool, red, wiggly and slippery it was. I felt my own face brighten at the thought. She wore that expression of sheer amazement and joy at learning something new that is best seen on the face of a child. There was something so inviting in that expression that I'm sure it would have melted anyone's icy feelings toward worms. I wish we had all hunkered down right along with her to count that earthworm's segments, to feel its bristles, to puzzle over that strange thickening on its body, to discuss its life.

I wish we could always be in tune with that look, to search for it on the faces of our children, to see it as an invitation to encourage them as they learn about their world, even the parts of it we don't find so appealing ourselves. Think of the time we spend with kids as an open invitation to share in their sense of wonder, and as an opportunity to renew it in ourselves.

A NATURE PRIMER



If you are with a child and you happen to find something rotting, you have an opportunity to discuss decay and the role played by the living things that contribute to this essential natural process. The following is an example of how such a simple discovery can lead to an exploration and a lesson in how nature works.

The pillbug unrolled itself like a tiny armadillo in the palm of Grandma's hand. Her grandson Tyler leaned closer. "Oh, he's moving," he said, as the creature walked out to the end of a finger.

Grandma put it back on the rotting stump. "I wonder what else we can find here?" she asked. They both knelt down to find out.

"See how you can push your fingers right into the rotting wood? What does it feel like?" Grandma asked.

"Spongy and crumbly," he said.

"How does it smell?" she asked.

Tyler cupped a handful of the humus to his nose. "It smells good. Like the woods," he replied.

"Now," Grandma explained, "when you put that down, it will become part of the soil. Then, plants will take things out of it that they need to grow."

Tyler thought for a moment. "So, this tree died, but other trees need it to live," he said.

"You're right," Grandma said. "Trees, pillbugs and we, too, are made out of things that keep getting used over and over again; things that have just been shuffled around and borrowed by living things all around the world for millions of years." Tyler looked puzzled. Grandma continued, "Like water, which is what we're mostly made of. Who knows where some of 'our' water was ten years ago? In a rainstorm over India, maybe? How about millions of years ago? Being lapped up by a dinosaur?"

"Wow," Tyler exclaimed, "*Dinosaur* water, in *me*?"

"Could be," said Grandma. "But lots of the materials that animals and plants are made of need living helpers to get them reused. Helpers like these puffballs growing over here. They're a kind of fungus. They borrow things they need from the remains of dead plants and animals, and then add them to soil so they can be used by growing plants again."

"Are there any other helpers besides fungus?" Tyler asked.

"Wow," Tyler exclaimed, "Dinosaur water, in me?"

"Oh, yes," Grandma replied. "Tiny living things called bacteria, and living things that are big enough to see, like pillbugs and earthworms."

"What would happen if they didn't help the way they do?" Tyler asked.

"Well, when living things died, they would stay just as they are, preserved like Egyptian mummies," Grandma replied. "Bodies and wastes would pile up all over. That means less and less of the things that plants need to grow would be in the soil where plants could find them with their roots. Plants would stop growing and die, and that would mean no more food for other living things. I don't even like to think of what would happen in a world like that."

"Me neither, Grandma," said Tyler, as the two of them stood up and began to walk home.

Did you know...

In the top three inches of a square foot of garden soil there may be over 100 billion decomposers. Most of these are microscopic bacteria, protozoans and fungi.

Millions of earthworms may inhabit an acre of soil. (An acre is a little smaller than a football field.) Some kinds of earthworms burrow up to six feet deep, but they feed mostly on fallen leaves and other plant material.

As earthworms burrow they ingest organic materials from the garden or forest floor, as well as soil particles. These materials pass through their digestive tracts and are deposited as the casts that are often seen. This burrowing and casting slowly overturns the soil, perhaps 40 tons per acre per year.

READY

A rotting log is a great place to find decomposers at work. Find a log that has been decaying for some time and explore it with your children. You might want to have a hand lens, along with field guides if you're with older children.

SET

Sit down next to the log and start your exploration with eyes closed. Tap the rotting wood and **listen.** Is the sound sharp or dull, solid or hollow? Run your hands over its surface. What does it **feel** like to you? Is it cool or warm, wet or dry, rough or smooth? Now, cup some of the decaying wood in your hands, if possible, and **smell.** What does the odor remind you of?

GO

Now, explore the log with eyes open. See what's on top, underneath and inside by prying off small pieces at a time. Find several decomposers and investigate them closely. Discuss them with your children. How did the living things get here? What are they doing now? What and how do they eat? Identify the living things if you can, using field guides to aid you. Among the creatures you're likely to find are many kinds of molds and mushrooms, which are fungi; earthworms; snails and slugs; pillbugs and millipedes; spiders; and various insects such as beetles, ants and termites. A rotting log is really an ecosystem, with a community of living things that do many different jobs.

When you and your children have finished exploring, return the log and its living things to where you found them. Ask yourself and your children what this rotting log will look like ten years from now. What will have changed? How would it be different if there were no decomposers living here?

On the way home, take a few minutes to explore your feelings about the rotting log. Take turns completing either of these two statements: "The thing I liked best about the rotting log was..." or "The thing I liked least about the rotting log was..."

Adapted from "Rotting Logs," Hands-On Nature, edited by Jenepher Lingelbach, published by Vermont Institute of Natural Science, Woodstock, VT.

Develop a working relationship with the decomposers in your backyard by making a compost pile. In addition to learning a great lesson on the crucial role that decomposers play, you'll: 1. Reduce the flow of waste that goes out to the curb and down the garbage disposal; 2. Save valuable landfill space; and 3. Create a continuous supply of the very finest garden soil additive: brown, crumbly, sweet-smelling compost.

Life in a Log*

Illustration by Mark Baldwin

GLOSSARY

bacteria—very tiny single-celled living things

decomposers—living things that assist in the natural process of decay

ecosystem—a community of living things together with its physical environment

element—a substance made up of only one kind of atom

fungi—a group of living things that includes yeasts, molds and mushrooms

humus—a brown or black substance consisting of decayed plant material that provides nutrients for plants and increases the ability of soil to hold water

NATURALLY GOOD READING

Books and other resources for nature studies with children

Earthworms *by Chris Henwood and Barrie Watts. Franklin Watts, London, 1988.* Color photos and text describe how to collect and observe earthworms.

Outdoor Biology Instructional Strategies (OBIS) Project. *Developed by the Lawrence Hall of Science, University of California at Berkeley, and published by Delta Education of Nashua, New Hampshire. OBIS consists of 97 outdoor activities designed to help kids develop a first-hand knowledge of how nature works. They are available individually or as a collection. All are easy to read, and make use of easy-to-find materials. Ones that focus on decay organisms include "Logs to Soil" and "Litter Critters."*

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Birds, Bats & Butterflies

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Birds, Bats & Butterflies is produced especially for parents, teachers and others who work with children.

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Birds Bats & Butterflies

Number 4

A leaflet for adults who want to share nature with children

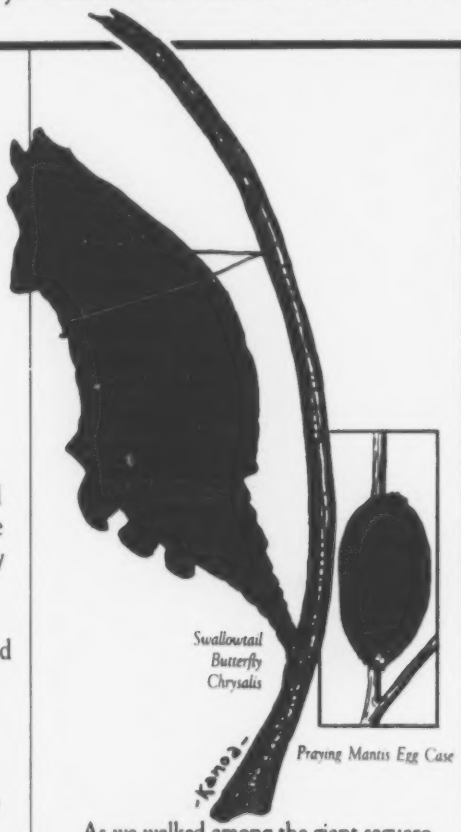
December 1991

Winter Bug Watching

by Steve Prchal, Director
Sonoran Arthropod Studies, Inc.
Tucson, AZ

nce, years ago when my daughter was still quite young, we were talking about her day at school. She had been studying the seasons as they do in the second grade and that day she had learned about bears hibernating, birds flying south and how leaves turn golden yellow and red before falling to the ground. These signs of advancing winter are recognized by many people, but in the desert the changing of the seasons is much more subtle; spectacular shows of color are foreign to inquisitive children living here.

That weekend Julie and I took a walk to explore the ways desert animals respond to the shorter, cooler days of winter. Here, as in tropical rainforests and temperate deciduous forests, insects are the most commonly seen group of animals. In this environment, it is easy to recognize the changing of seasons by watching the insects. Being in tune with their lives and recognizing the little changes that each day brings broadens our understanding of the natural system we share.



As we walked among the giant saguaro, the green-stemmed palo verde trees and fragrant creosote bushes, we discovered that some insects pass the winter in their egg stage. Their eggs, resistant to cold weather and needing no food, would hatch in the spring when days become longer and warmer and food is readily available.

... we discovered the chrysalis of a swallowtail butterfly.

Julie was the first to spot a praying mantis' egg case. It was firmly anchored to the stem of a creosote bush and looked a lot like a small loaf of bread. No longer the oozing, frothy mixture it was when the female first deposited it a month or two earlier, the egg case was now a hard protective structure with a double row of pores from which about 50 young would hatch in the spring. We talked about how praying mantids need other insects for food and how few there were during the winter months. On the same plant we also discovered eggs of the creosote katydid, a cryptic green and white insect whose males make a clicking sound to attract females. This insect inserts its eggs individually into the creosote leaves—the shiny black edge of an oval egg was barely visible.

On a low-growing shrub nearby, we discovered the chrysalis of a swallowtail butterfly. A single silk thread lassoed the chrysalis to a branch where it would remain inactive through the winter, giving no clue to the beauty and grace which would take wing in the spring.

Discovery in nature, even during the short and cold days of winter, can be very rewarding, especially when you include children. Insects, like children, are small and it is easy for a child to relate to them—to bond with them in anticipation of spring wildflowers and the many hummingbirds commonly seen when the desert awakens. Take a moment this winter to share the stillness—life at rest—with a child close to you. You'll be glad you did.

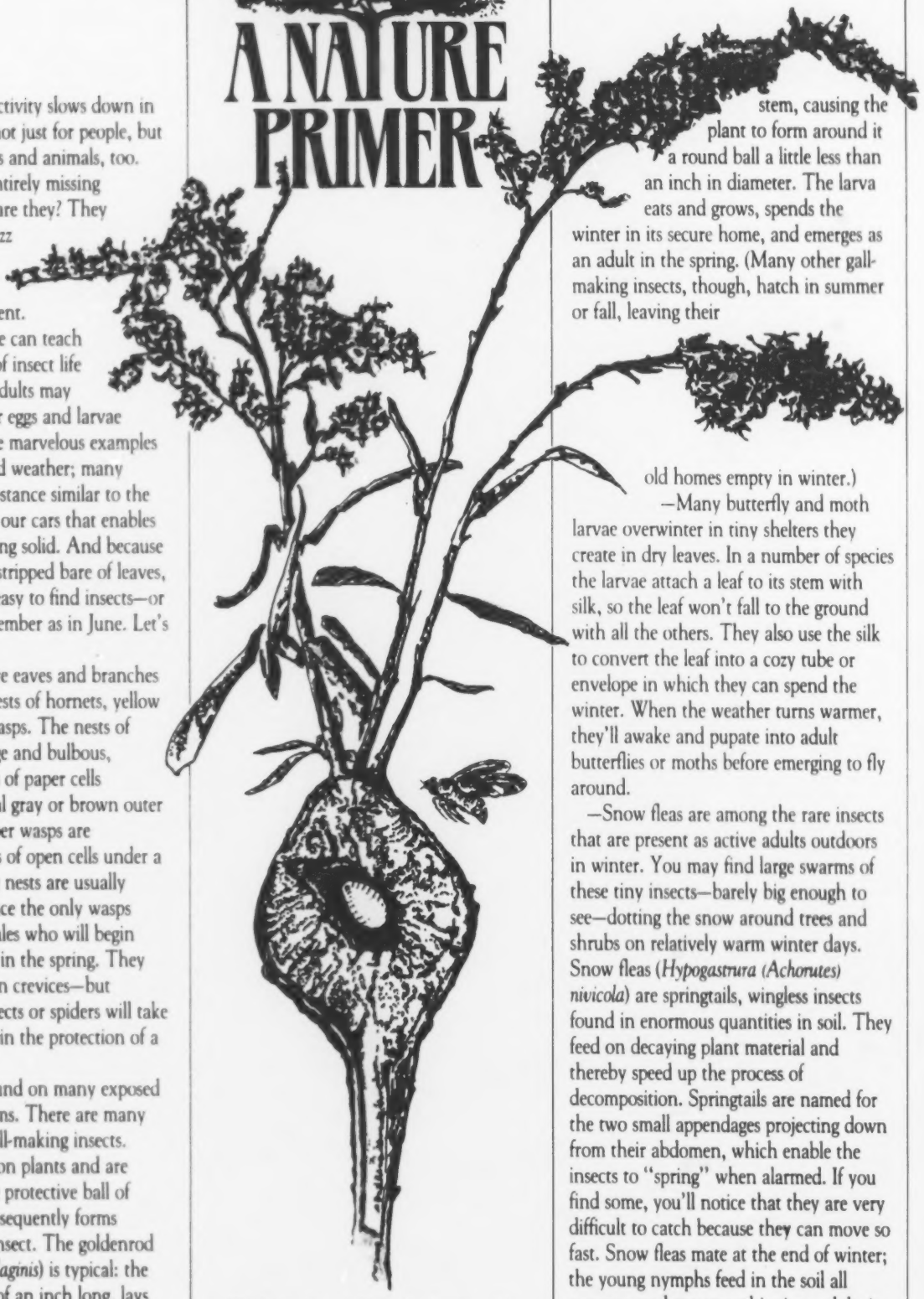
Illustrations on this page from Sonoran Arthropod Studies, Inc. Originally published in Backyard Bugwatching.

A NATURE PRIMER

Outdoor activity slows down in winter, not just for people, but for plants and animals, too. Insects are almost entirely missing from the scene—or are they? They don't flutter and buzz about our heads on a winter walk, but they're still present. In fact, their absence can teach children the basics of insect life cycles: though the adults may have vanished, their eggs and larvae have not. Insects are marvelous examples of adaptation to cold weather; many actually create a substance similar to the antifreeze we put in our cars that enables them to avoid freezing solid. And because so many plants are stripped bare of leaves, it can be almost as easy to find insects—or their traces—in December as in June. Let's take a little tour...

—Under protective eaves and branches you may find the nests of hornets, yellow jackets and paper wasps. The nests of the first two are large and bulbous, consisting of a series of paper cells enclosed with several gray or brown outer layers. Those of paper wasps are simpler—just a series of open cells under a protective roof. The nests are usually empty in winter, since the only wasps around are the females who will begin next year's colonies in the spring. They overwinter in hidden crevices—but sometimes other insects or spiders will take up winter residence in the protection of a paper nest.

—Galls can be found on many exposed weed and shrub stems. There are many different kinds of gall-making insects. They lay their eggs on plants and are distinguished by the protective ball of plant tissue that subsequently forms around the young insect. The goldenrod gall fly (*Eurosta solidaginis*) is typical: the adult fly, a quarter of an inch long, lays her eggs on a young goldenrod in the spring. The larva crawls into the plant stem, causing the plant to form around it a round ball a little less than an inch in diameter. The larva eats and grows, spends the winter in its secure home, and emerges as an adult in the spring. (Many other gall-making insects, though, hatch in summer or fall, leaving their old homes empty in winter.)



The fly larvae is visible inside this dissected goldenrod gall. In the spring, it will become the adult fly as pictured above.

—Many butterfly and moth larvae overwinter in tiny shelters they create in dry leaves. In a number of species the larvae attach a leaf to its stem with silk, so the leaf won't fall to the ground with all the others. They also use the silk to convert the leaf into a cozy tube or envelope in which they can spend the winter. When the weather turns warmer, they'll awake and pupate into adult butterflies or moths before emerging to fly around.

—Snow fleas are among the rare insects that are present as active adults outdoors in winter. You may find large swarms of these tiny insects—barely big enough to see—dotting the snow around trees and shrubs on relatively warm winter days. Snow fleas (*Hypogastrura (Achorutes) nivicola*) are springtails, wingless insects found in enormous quantities in soil. They feed on decaying plant material and thereby speed up the process of decomposition. Springtails are named for the two small appendages projecting down from their abdomen, which enable the insects to "spring" when alarmed. If you find some, you'll notice that they are very difficult to catch because they can move so fast. Snow fleas mate at the end of winter; the young nymphs feed in the soil all summer, and metamorphize into adults in the fall.

READY

Insects are common enough that you can find their traces almost everywhere. Spend a few hours on an expedition to a woodlot, weedy field or vacant lot. Dress warmly, so you can observe in comfort. Bring along a hand lens, a pocketknife and some drawing materials. If it's a really cold day you might prefer to collect some samples and observe them more closely indoors.

SET

One effective approach to exploring the outdoors is to visualize things from an insect's point of view. Encourage children to imagine that they are insects. They need secure places where they will be protected all winter long from moisture, wind and predators. Tell the children to use their imaginations, and to think small. Look for dried leaves hanging on trees, loose bark on tree trunks or downed logs and dense patches of dried weeds. If a child does find a hidden insect adult, larva or egg, discuss the find with him or her. How effective is its home? Is it protected enough? What's the first thing that would happen here in the spring?

GO

Of course, the drama of life and death, hunter and hunted, does not stop in winter. In many wooded areas and overgrown fields you can find mixed feeding flocks of small birds—chickadees, nuthatches and woodpeckers—that forage on twigs and bark for hidden insect larvae and eggs. Observe the birds closely to see exactly where they are feeding and, once they've flown on, examine those places. Can you find anything they've missed? Ask the children to think about how many trees and shrubs the birds need to search every day in order to find enough to eat.

Have your children conduct a search for the unique forms that arthropods create, such as egg cases built by praying mantises and many spiders. Encourage the joy of discovery; remember that stimulating children's excitement about the outdoors is far more important than being able to name or classify everything you find (indeed, there are so many sorts of insects that many expert naturalists can't fully classify them either.)

Galls are distinctive and common winter forms. Look for them on goldenrod stems, oak leaves and willow twigs. Inspect a gall closely. If you can find one with a tiny hole, it's probably empty. Open it with a knife. What's inside? Ask the children whether they think the occupant outgrew this home. Or was it eaten by another animal? Have children draw the gall.

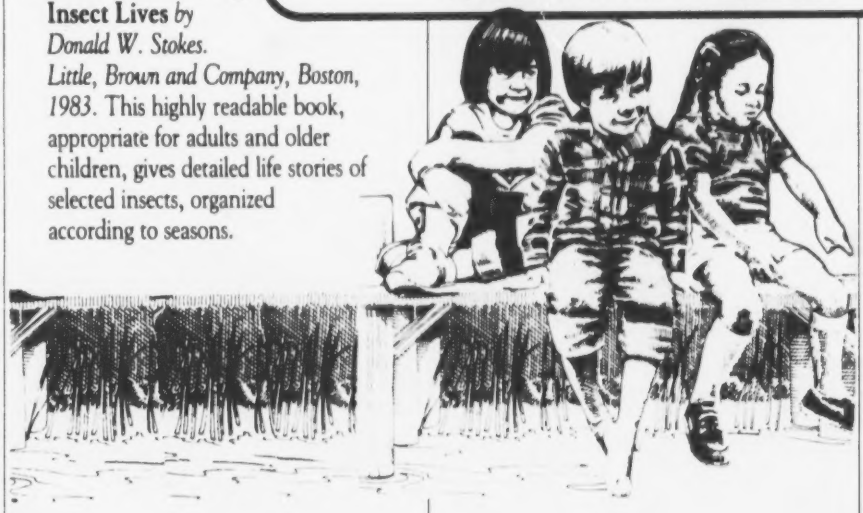
If you find a wasp or hornet nest in the winter, you can bring it inside. Have the children examine the paper it is made of, and discuss how the insects made it. Have the children draw the nest and speculate on the lives of the insects that lived there. Unique forms like wasp nests can form the basis of fun art projects—you can suggest, for example, that the children can paint a nest with watercolors or acrylics. Perhaps they could even make a unique holiday decoration.

NATURALLY GOOD READING

Books and other resources for nature studies with children

The Naturalist's Year *by Scott Camazine, Wiley and Sons, New York, 1987.* One chapter describes how and where insects and other animals spend the winter.

A Guide to Observing Insect Lives *by Donald W. Stokes. Little, Brown and Company, Boston, 1983.* This highly readable book, appropriate for adults and older children, gives detailed life stories of selected insects, organized according to seasons.



Insect *by Laurence Mound, (Eyewitness series), Alfred A. Knopf, New York, 1990.* This photographic picture book presents a graphic overview of insect life that is fascinating to all ages.

The **Peterson Field Guide Series,** *edited by Roger Tory Peterson. Houghton Mifflin Company, Boston.* For the basics of identification and classification:

- **Insects of America North of Mexico** *by Borror and White*
- **Butterflies** (Eastern and Central) *by Klots*
- **Western Butterflies** *by Tilden and Smith*
- **Moths** *by Covell*
- **Beetles** *by White*
- **First Guide to Insects of North America** *by Leahy and White*
- **A Field Guide to Butterflies Coloring Book** *by Peterson, Pyle and Hughes*

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